MSDS

- **BR-2/3A EFS Battery**
- **CO_2 Cartridge**
- **CR-3032 EFS Battery**
- **HDX-106 Explosive**
- **Lead Chloride Seawater Battery**
- **$LiSO_2$ Main Power Battery**
- **Silver Chloride Seawater Battery**
- **SX2 Explosive**
- **Thermal Battery**

Guide to Using Material Safety Data Sheets (MSDS)

This guide may be a useful starting point for interpreting MSDSs. Contact your local Environmental Safety Office for assistance.

The U.S. chemical manufacturing industry and federal government developed a chemical identification system, which requires that a descriptive paper document accompany every chemical shipped, used or stored. These documents are called Material Safety Data Sheets (MSDS) and they are sent to users such as industries, hospitals, universities and others when the chemicals are shipped. A company that produces chemical products writes MSDSs for them.

The following questions can be answered by reading an MSDS, although not all questions apply to all chemicals.

What is the Chemical or Substance and Who Makes It?

- What is the name of the chemical as it appears on a container's label?
- What is the trade or brand name that the manufacturer uses?
- What is the chemical's common name?
- What is the scientific name?
- Who makes it?
- What is the company's address?
- What is the company's emergency telephone number?
- What is the Chemical Abstracts Service (CAS) number (for identifying it in case you misspell or misread the name)?

Hazardous Ingredients--What is in a chemical?

- What is the "permissible exposure level" (PEL)? The PEL tells how much (the concentration) of an air contaminant a worker can be exposed to for 8 hours a day, 40 hours a week, over a working lifetime (30 years), without suffering adverse health effects.

- What is the "threshold limit value" (TLV) recommended by the American Conference of Governmental Industrial Hygienists even though the TLV is not enforceable? The TLV is a term used to express how much of a substance in the air nearly everyone can be exposed to day after day, without adverse effects.

    - The TLV is expressed in three ways:

        - TLV-TWA: the allowable time-weighted average concentration for a normal 8-hour workday or 40-hour work week.

        - TLV-STEL: the Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period. The most allowed are four such periods in a workday, with at least 60 minutes between exposure periods, as long as the TLV-TWA is not exceeded.

        - TLV-C: the Ceiling limit--the amount of concentration that should not be exceeded, even for brief periods.

- Unfortunately, because most chemicals have not been tested for their long-term health hazard, reproductive effects or potential to cause cancer, these PEL and TLV descriptions merely serve as warnings.

Physical Data--How does it react?

What is the vapor pressure?

This is important for people concerned with shipping, storing and disposal. Vapor pressure is the pressure of gas at the surface of a liquid that is evaporating. Gasoline, for example, evaporates easily. Sometimes you can see it evaporating as you fill your cars gas tank. Liquids that evaporate easily are worrisome because vapor can build up around you quickly. It is a particularly big problem in confined spaces. The lower the boiling point of a substance, the higher its vapor pressure.

What is the Specific Gravity?

This refers to a material's weight compared to that of an equal amount of water. Substances having a specific gravity of 1, such as liquid Drano (a household flushing liquid for toilet and sink drains) and other acids, will sink in water; those with specific gravity less than 1, such as oils, will float. Most flammable liquids have a specific gravity less than 1.0 and if not soluble, will float on water. This is important for fire suppression and for handling emergency spill situations where something might enter a body of water. It also has bearing on how the substance is handled in conjunction with other substances with which it might be mixed.

What is its Appearance and Odor?

These are important to someone who handles it. Appearance and odor refer to what something looks and smells like. SaniTuff, for example, is described as green and viscous (soupy) with a citrus (orangy-lemony) odor. The big concern is that just because you can smell something doesn't mean you can tell how much of it is present! Some gases, such as carbon monoxide, affect you without you ever knowing it. You can become accustomed to others, such as hydrogen sulfide, without ever knowing it and therefore you wouldn't notice that it was building to a deadly level.

What is its Solubility?

This might be important for someone concerned with environmental effects. Solubility refers to how much of a substance can dissolve in water or other substances. Water is frequently used as a standard or base for comparison. If less than 0.1 percent can dissolve, such as kerosene and propane, then the amount is considered “negligible.” If 0.1 percent to 1.0 percent can dissolve, it is considered “slight.” If 1 to 10 percent can dissolve, it is considered “moderate.” If more than 10 percent can dissolve, it is considered “appreciable.” Complete means the whole works, such as windshield solvent and ammonia, can dissolve.

What is the boiling point?

This is the temperature at which a liquid boils and turns into a gas; something to worry about with liquids that are highly flammable. This factor is of concern during storage and transportation, as well as handling on the job.

What is its Vapor Density?

This is the weight of a gas compared to an equal amount of air, which is 1. If the density is greater than 1, like kerosene (4.7), its vapors will sink. If it is lower than 1, like ammonia is (0.596), it will rise. This factor can be a problem depending upon whether you are working in a low or high position, particularly in confined spaces, and the vapor rises or falls easily. It is also of interest in emergency spill situations where large quantities might escape and either rise quickly above ground level presenting little danger to people, or remain close to ground level and present a health threat.

What are its Melting and Freezing Points?

These are the temperatures at which a solid, such as ice, becomes a liquid under normal atmospheric pressure, or freezes and becomes a solid.

What is the Evaporation Rate?

This describes how slowly or quickly a substance evaporates in comparison to another material. This measure is similar to the volatility mentioned for vapor pressure except that it uses materials other than mercury as a reference standard. A number greater than 1 (ether is rated as 1) indicates a material that evaporates more easily than the comparison substance. Alcohol, benzene and 1,1,1-trichloroethane are examples of substances that evaporate rapidly or easily. A number less than 1 means it evaporates more slowly, such as ammonia.

What is the Potential for Fire and Explosion?

When will a fire start and what should be done about it? How easily will a substance catch fire or explode and what material should be used to fight fires and explosions?

What is the flash point of a substance?

This is the lowest temperature at which you better start worrying about flammable or explosive vapors. Benzene, lighter fluid and gasoline, for example, have low flash points--they ignite easily. Tar-like Number 6 fuel oil is an example of a substance with a high flash point--it doesn't ignite easily.

What is the flammability or explosive limit?

This tells you how much gas or vapor must be present before a spark (including a lit cigarette) will set it off. LEL and UEL (lower and upper explosive limit) numbers are used to describe the range within which fire or explosion can occur. This means that if an ignition source, such as a flame or heat is present, a fire can occur. When the mixture is present at concentrations below the LEL, the mixture is too lean to burn. At concentrations higher than the UEL, the mixture is to rich to burn. For example, a range of LEL of 7% and a UEL of 15% of 1,1,1-trichloroethane must be present for fire to occur. A range of LEL 2.1% to UEL 9.5% applies to propane.

What Extinguishing media are required to put out Class A, B, C and D fires?

- Quench Class A wood and paper fires with water.
- Smother Class B fires of flammable liquids and greases with foams, dry chemicals, halon and other inert gases.
- Smother Class C electrical fires with nonconductive materials such as dry chemicals, halon and other inert gases. Do not use water because it conducts electricity.
- Smother Class D Fires involving metals and metal alloys with fine sand, graphite powder and mixtures of salt and polymer binders or inert gases.

What is its Reactivity?--What are the conditions under which a substance will change form?

When is a substance likely to undergo chemical reaction either by itself or with other materials? In other words, what must the conditions be like for a chemical to change from a solid to liquid or liquid to gas.

What is the Stability?

This tells you whether the bonds that hold a chemicals molecules together are strong or weak and make the substance stable or unstable under various conditions.

Is there any incompatibility?

What other substances should be kept away from the substance? If a substance contacts certain incompatible substances, the two may react and form a new hazard or may burn or explode and break down into newer hazards. For example, propane is incompatible with oxidizing agents and chlorine dioxide; and 1,1,1 -trichloroethane is

incompatible with caustic soda, caustic potash, and oxidizing agents. Some brands of scouring cleanser may be incompatible with acid.

Are there hazardous decomposition products?

This tells you whether the substance can break down under certain conditions and release toxic or flammable vapors or gases.

Brake fluid, windshield solvent and propane, for example, all break down and produce carbon monoxide when burned. 1,1,1-trichloroethane, a common degreaser used in industry, produces hydrogen chloride (hydrochloric acid) and possibly traces of phosgene, a highly dangerous nerve gas.

Can hazardous polymerization occur?

This is a chemical reaction that can cause a fire or explosion and sometimes release hazardous gases. Burning plastics, for example, releases the highly harmful hydrochloric acid.

Hydrogen cyanide is another example. It is flammable and poisonous, and in the liquid state has a tendency to polymerize in the presence of alkaline materials. One of the materials from the polymerization reaction is ammonia, which means eventually an explosive reaction will take place. When potassium cyanide and sodium cyanide contact acids poisonous and flammable hydrogen cyanide vapor is released.

Health Hazards

- Can substances enter your body either by inhalation, ingestion or through the skin?
- What are the short- (acute) and long-term (chronic) harmful effects?
- What are the short-term reactions to high exposures?
- Are there Carcinogens? For example, methylene chloride, found in paint removers and thinners, that can cause cancer. What are the signs and symptoms of exposure, medical conditions generally aggravated by exposure?
- Are there Corrosives? Acids, for example, destroy skin cells or cause irreversible damage at the site of contact. Battery acid is an example of a corrosive.
- Are there toxic chemical? Chlorine gas, for example, can kill in high doses.

- Is it an irritant? For example, household ammonia can irritate the eyes and skin of animals and people.

- Are there sensitizers? These cause an allergic reaction in a "substantial proportion" of an exposed group of people. Certain plants found in forests, fields and marshes are common sensitizers because they cause skin rash. In the workplace, for example, toluene diisocyanate, found in some polyurethane, and methylene biphenyl isocyanate, found in urethane foams, are sensitizers.

- Are there target organ effectors? These selectively damage one major organ or system of the body such as the lungs, kidneys or nervous system. For example, asbestos damages the lungs and butyl cellosolve, found in consumer products such as Fantastik, damages the kidneys. Used in small quantities around the home, consumer products present no danger, but when used for long periods of time in a workplace they do.

Spill or Leak Procedures

If a substance is released, how should it be disposed of? What precautions should be taken during handling and storage?

Special Protection

What respiratory protection, ventilation, protective gloves, eye protection, other protective clothing, and hygiene practices should be taken in the workplace?

First Aid

What first aid should be given in case of exposure?

LITHIUM BATTERY MSDS - SAFT 'C,' 'D,' or 'Mini-D' CELL

SAFT AMERICA -- LITHIUM SULFUR DIOXIDE BATTERY
MATERIAL SAFETY DATA SHEET
FSC: 6135
Manufacturer's CAGE: 7X634
Part No. Indicator: B
Part Number/Trade Name: LITHIUM SULFUR DIOXIDE BATTERY
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General Information
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Item Name: BATTERY, NONREACHARGEABLE
Company's Name: SAFT AMERICA INC
Company's Street: 313 CRESCENT ST
Company's City: VALDESE
Company's State: NC
Company's Country: US
Company's Zip Code: 28690
Company's Emerg Ph #: 800-424-9300 (CHEMTREC)
Company's Info Ph #: 704-874-4111
Safety Data Action Code: A
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 004
Status: SMJ
Date MSDS Prepared: 31JAN92
Safety Data Review Date: 21FEB95
MSDS Serial Number: BWRCN
Hazard Characteristic Code: NK
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Ingredients/Identity Information
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Proprietary: NO
Ingredient: LITHIUM (METAL)
Ingredient Sequence Number: 01
Percent: <2.5
Ingredient Action Code: A
NIOSH (RTECS) Number: OJ5540000
CAS Number: 7439-93-2
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SULFUR DIOXIDE (SARA 302)
Ingredient Sequence Number: 02
Percent: <25
Ingredient Action Code: A
NIOSH (RTECS) Number: WS4550000
CAS Number: 7446-09-5
OSHA PEL: 5 PPM
ACGIH TLV: 2 PPM/5 STEL

Proprietary: NO
Ingredient: ACETONITRILE (SARA 313) (CERCLA)
Ingredient Sequence Number: 03
Percent: <6
Ingredient Action Code: A
NIOSH (RTECS) Number: AL7700000
CAS Number: 75-05-8
OSHA PEL: 40 PPM
ACGIH TLV: 40 PPM/60 STEL

Proprietary: NO
Ingredient: CARBON BLACK; (ACETYLENE BLACK)
Ingredient Sequence Number: 04
Percent: <5
Ingredient Action Code: A
NIOSH (RTECS) Number: FF8000000
CAS Number: 1333-86-4
OSHA PEL: 3.5 PPM (MFR)
ACGIH TLV: 3.5 PPM (MFR)

Proprietary: NO
Ingredient: SUPDAT: OTHER MATLS. AIR-CONDITIONING OR COOLING IS NOT REQD UNLESS EXCESSIVELY HIGH TEMP WILL BE ENCOUNTERED BUT BATTERIES SHOULD BE KEPT AS COOL AS POSS IN ORDER TO INSURE MAX SHELF LIFE. TEMP ABOVE 160F SHOULD BE AVOIDED. HERMETICALLY SEALED LITHIUM CELLS DO NOT OUTGAS. HOWEVER, IF EXPOSED TO EXTREME TEMP/ROUGH HNDLG THEY MAY RELEASE SULFUR DIOXIDE GAS IF VENT IS ACTIVATED OR BATTERY DMGD. WELL-VENTILATED STOR AREA SHOULD BE USED TO PVNT INADVERTENT CONC OF GAS IF EXTREMES ARE REACHED. IF LG QTYS OF BATTERIES ARE STORED, IT MAY BE ADVISABLE TO INSTALL ALARM DEVICES IN STOR AREA TO DETECT SMOKE/ACCUMULATION OF GASES
Ingredient Sequence Number: 05
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

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Physical/Chemical Characteristics
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Appearance And Odor: NOT APPLICABLE
Boiling Point: N/A
Melting Point: >200F,>93C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: >1 (H2O=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: NOT SOLUBLE IN WATER
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Fire and Explosion Hazard Data
==========
Flash Point: NONFLAMMABLE
Flash Point Method: N/P
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER/CO2 ON BURNING LITHIUM SULFUR DIOXIDE CELLS/

BATTERIES. USE CLASS D FIRE EXTING AGENT ONLY ON RAW LITHIUM FIRE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: BATTERY MAY VENT WHEN SUBJECT TO EXCESSIVE HEAT-EXPOSING CELL CONTENTS.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): BATTERY CONTAINS HERMETICALLY SEALED CELLS & IS NONREACTIVE PROVIDED BATTERY INTEGRITY IS MAINTAINED & CELL (SUPDAT)
Materials To Avoid: NOT APPLICABLE
Hazardous Decomp Products: NOT APPLICABLE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): HEATING, MECH ABUSE, & ELEC ABUSE (SUCH AS RECHARGING, VOLTAGE REVERSAL & SHORT CIRCUITING) MAY RSLT IN VENTING.

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Health Hazard Data

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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: DEPENDING ON CONCENTRATION OF SULFUR DIOXIDE EXPOSURE, IT ACTS AS AN ASPHYXIANT AND MAY POSSIBLY CAUSE UNCONSCIOUSNESS WITH NO KNOWN CHRONIC HEALTH EFFECTS. SULFUR DIOXIDE: IRRITATION OF NOSE, THROAT, EYES, AND/OR SKIN; SUFFOCATING ODOR.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: SULFUR DIOXIDE - ASTHMA AND OTHER RESPIRATORY DISEASES.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH W/POTABLE WATER FOR MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD (FP N). SKIN: FLUSH W/COPIOUS AMTS OF WATER. CALL MD. (FP N). INHAL: REMOVE PERSON FROM CONTAMD AREA TO FRESH AIR. INGEST:DRINK 2 GLASSES OF WATER TO DILUTE. IF CELL VENTS, PERS SHOULD BE EVACUATED FROM CONTAMD AREAS. ARTF RESP SHOULD BE GIVEN IF BREATHING STOPS.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: KEEP OUT OF AREA UNLESS USING IMPERVIOUS GLOVES & CLOTHING, & FULL-FACE BREATHING APPARATUS. PROVIDE MAXIMUM VENT TO CLEAR OUT HAZARDOUS GASES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: DO NOT REMOVE OR BYPASS ELECTRICAL OR THERMAL FUSES. DO NOT HEAT ABOVE 200F.
Other Precautions: LI/SO2 CELL IS CAPABLE OF LONG TERM STOR @ TEMP AS HIGH AS 160F, COMPARED TO MAX OF ABOUT 180F FOR MOST PRIMARY BATTERY SYS. STOR FOR MORE/1 YR @ 160F HAS BEEN DEMONSTRATED. STOR @ LOWER TEMP WILL IMPROVE CAPACITY RETENTION OF (SUPDAT)

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Control Measures
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Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: PROVIDE MAXIMUM VENTILATION TO CLEAR OUT HAZARDOUS GASES.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPRVD SFTY GLASSES (FP N).
Other Protective Equipment: IMPERVIOUS CLOTHING.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: CNDTNS TO AVOID:SEAL REMAINS INTACT. HNDLG/ STOR PREC:BATTERY. FOR EXAMPLE, SHELF LIFE OF 10 YRS IS PROJECTED FOR STORAGE OF LI/SO2 CELLS & BATTERIES SHOULD BE STORED IN WELL-VENT, SPRINKLER-PROTECTED, NON-COMBUST STRUCTURE W/ADEQ CLEARANCE BETWEEN WALLS & BATTERY STACKS.
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Transportation Data
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Disposal Data
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Label Data
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Label Required: YES
Technical Review Date: 21FEB95
Label Date: 23FEB95
Label Status: M
Common Name: LITHIUM SULFUR DIOXIDE BATTERY
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: DEPENDING ON CONCENTRATION OF SULFUR DIOXIDE EXPOSURE, IT ACTS AS AN ASPHYXIANT AND MAY POSSIBLY CAUSE UNCONSCIOUSNESS WITH NO KNOWN CHRONIC HEALTH EFFECTS. SULFUR DIOXIDE: IRRITATION OF NOSE, THROAT, EYES, AND/OR SKIN; SUFFOCATING ODOR.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SAFT AMERICA INC
Label Street: 313 CRESCENT ST
Label City: VALDESE
Label State: NC
Label Zip Code: 28690
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

SX2 EXPLOSIVE MSDS

NORTH AMERICAN EXPLOSIVES -- PRIMASHEET 2000 SX2 DEMEX200, SX20735MM
MATERIAL SAFETY DATA SHEET
Part No. Indicator: A
Part Number/Trade Name: PRIMASHEET 2000 SX2 DEMEX200, SX20735MM
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General Information

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Company's Name: NORTH AMERICAN EXPLOSIVES
Company's Street: 670 HOPMEADOW ST
Company's P. O. Box: 499
Company's City: SIMSBURY
Company's State: CT
Company's Country: US
Company's Zip Code: 06070
Company's Emerg Ph #: 203-651-2670
Company's Info Ph #: 203-651-2670
Safety Data Action Code: C
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 27FEB89
Safety Data Review Date: 25SEP91
MSDS Preparer's Name: M HAYES
Preparer's Company: SAME
MSDS Serial Number: BLDYM
Hazard Characteristic Code: E1
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Ingredients/Identity Information

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Proprietary: NO
Ingredient: CYCLONITE
Ingredient Sequence Number: 01
Percent: 88.2
NIOSH (RTECS) Number: XY9450000
CAS Number: 121-82-4
OSHA PEL: S, 1.5 MG/M3
ACGIH TLV: S, 1.5MG/M3; 9192

Proprietary: NO
Ingredient: PROPENE, 2-METHYL-, POLYMERS; (POLYISOBUTYLENE)
Ingredient Sequence Number: 02
Percent: 8.2

NIOSH (RTECS) Number: UD1010000
CAS Number: 9003-27-4
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SEBACIC ACID, BIS(2-ETHYLHEXYL)ESTER; (DI-(2-ETHYLHEXYL) SEBICATE)
Ingredient Sequence Number: 03
Percent: 2.2
NIOSH (RTECS) Number: VS1000000
CAS Number: 122-62-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ETHYLENE, TETRAFLUORO-, POLYMER; (POLYTETRAFLOUROETHYLENE)
Ingredient Sequence Number: 04
Percent: 1.4
NIOSH (RTECS) Number: KX4025000
CAS Number: 116-14-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
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Physical/Chemical Characteristics

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Appearance And Odor: OLIVE DRAB, RUBBER-LIKE MATERIAL IN SHEETS OR VARIOUS EXTRUDED CROSS SECTIONS.
Boiling Point: NONE
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.6
Decomposition Temperature: N/K
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: NONE
Percent Volatiles By Volume: 0.1
pH: N/K
Corrosion Rate (IPY): N/K

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Fire and Explosion Hazard Data

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Flash Point: NONE
Flash Point Method: N/P
Lower Explosive Limit: NONE
Upper Explosive Limit: NONE
Extinguishing Media: WATER; BURNING MATERIAL MAY DETONATE UNDER SOME CONDITIONS.
Special Fire Fighting Proc: EXPLOSION HAZARD EXISTS. EVACUATE ALL PERSONNEL TO A SAFE PLACE. FIREMEN SHOULD NOT APPROACH FIRE. WEAR NIOSH/ MSHA APPROVED SCBA & FULL PROTECTIVE EQUIP (FP N).
Unusual Fire And Expl Hazrds: THIS MATERIAL MAY BE INITIATED BY IMPACT, FRICTION, AND ELECTROSTATIC DISCHARGE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): DO NOT SUBJECT MATL TO SHEARING, GRINDING, OR IMPACT BETWEEN HARD SURFACES. DETONATION MAY OCCUR. DO NOT STORE >170F.
Materials To Avoid: DO NOT STORE W/ACIDS, ALKALIES, REDUCING AGENTS, OXIDIZING AGENTS, AMMONIA, AMINES, PHOSPHOROUS & ORGANIC SOLVENTS.
Hazardous Decomp Products: FUMES FROM BURNING ARE TOXIC.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

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Health Hazard Data

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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CARE SHOULD BE TAKEN TO MINIMIZE CONTACT W/ SKIN & EYES, AND TO PREVENT INHALATION OF PYROLYSIS FUMES OR INGESTION. INGESTION OF RDX HAS CAUSED EPILEPTIFORM CONVULSIONS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: WASH W/WATER FOR A MINIMUM OF 15 MINUTES. SKIN: WASH W/WATER. INHAL: REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O2/ARTF RESP) (FP N). INGEST: ADMINISTER EMETIC. SEEK MEDICAL HELP.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: MAY BE SWEPT UP WITH NON-METALLIC IMPLEMENT.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE TO ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: TRANSPORTATION MUST BE IN ACCORDANCE W/ FEDERAL, LOCAL & STATE REGULATIONS. CLASS A HIGH EXPLOSIVES, DIVISION 1.1D.
Other Precautions: THIS MATERIAL IS A HIGH EXPLOSIVE, DANGEROUS MATERIAL. AVOID FUME INHALATION.

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Control Measures

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Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: NONE
Protective Gloves: RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: NONE
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

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Transportation Data

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Disposal Data

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Label Data

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Label Required: P
Technical Review Date: 25SEP91
Label Date: 25SEP91
Label Status: M
Common Name: PRIMASHEET 2000 SX2 DEMEX200, SX20735MM
Chronic Hazard: NO
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-Severe: X
Special Hazard Precautions: THIS MATERIAL IS A HIGHLY EXPLOSIVE, DANGEROUS MATERIAL. MAY BE INITIATED BY IMPACT, FRICTION, & ELECTROSTATIC DISCHARGE. ACUTE: INGESTION OF RDX HAS CAUSED EPILEPTIFORM CONVULSIONS. WASH THOROUGHLY AFTER HANDLING.
CHRONIC: NONE LISTED BY MANUFACTURER.

Protect Eye: Y
Protect Skin: Y
Label Name: NORTH AMERICAN EXPLOSIVES
Label Street: 670 HOPMEADOW ST
Label P.O. Box: 499
Label City: SIMSBURY
Label State: CT
Label Zip Code: 06070
Label Country: US
Label Emergency Number: 203-651-2670

HDX-106 Explosive MSDS

Manufacturer: HITECH, Inc.
POB 3112
East Camden, AR 71701

Section I.

Effective Date 11/01/93

Label Name: HDX-106

Chemical Name: N/A

Chemical Formula: $C_3H_6N_6O_6$ (RDX Only)

Molecular Weight: 222.13 (RDX Only)

Section II. Ingredients of Mixture

CHEMICAL NAMES	COMMON NAMES	WEIGHT %	ACGIH TVL (UNITS)
Cyclotriamethylene-trynitramine	RDX, Cyclonite, Hexegon	89.9-92.0	1.5 mg/m^3 TWA, skin
Polyisobutylene	Vistanex	2.1-2.5	Not estab.
Dioctyl Adipate or Dioctyl Sebacate	DOA or DOS	5.3-5.9	Not estab.
Petroleum Oil	Process oil	1.4-1.6	5 mg/m^3 mist

Section III. Physical Data

Boiling Point:	NA	Specific Gravity (H_2O=1):	1.7
Melting Point:	205 C w/decomp.	Percent Volatile (vol %):	NA
Vapor Pressure (mm Hg):	0	Evaporation Rate:	NA
Vapor Density (Air=1)	NA		
Solubility in Water:	Insoluble		
Appearance and Odor:	Puttylike plastic demolition explosive, white or off white		
Flash Point:	NA		

Flammable Limits (vol %):	LEL	UEL
	NA	NA

Extinguishing Media:

Water sprinkler/deluge system recommended

Fire Fighting Procedures

Do not attempt to manually extinguish fires. Burning explosives may accelerate to a detonation at any time when subjected to confinement, shock, or other sufficient initiation source.

Fire and Explosion hazard

Must not be confined if burning. Confinement can cause deflagration or transition to detonation with extremely violent results. Explosives may be retained in fissures, cracks, and crevices of structures, equipment, and containers which have been exposed to explosives. Property which may be contaminated by explosives must not be subjected to heat, sparks or flame. Detonation can occur. Thermal contamination under controlled conditions is the recommended method for complete decontamination. Thermal decontamination must be preceded by washing/steaming and chemical neutralization or dissolution. Contaminated property must not be buried.

Section V. Reactivity Data

Stability

HDX-106 is a military high explosive. HDX-106 has been assigned the United Nations Organization Classification of Class 1, Division 1 (mass detonating) based on the Department of Defense Explosives Hazard Classification Procedures, Army technical bulletin 700-2.

Conditions to Avoid

Avoid shock, heat, electrostatic discharge, impact, impingement and friction. High explosives will detonate when exposed to sufficient energy level.

Materials to Avoid

Avoid alkalis, particularly at elevated temperatures, strong acids and physical sensitizers such as glass, sand, and metal fragments.

Hazardous Decomposition Products

During decomposition toxic oxides of nitrogen are emitted

Hazardous Polymerization

May occur

Section VI. Health Hazard Data

Toxicology

The toxicology properties of RDX have not been fully investigated. LD-LO (Based on RDX, lowest lethal dose) Oral-rabbit-500 mg/kg; Intraperitonel-Rat-10 mg/kg; Oral-Cat-100 mg/kg; Intraveneous-Rat-18 mg/kg; Oral-Mouse-500 mg/kg. LD_{50} Oral-Rat-100 mg/kg; Oral-Mouse-500 mg/kg. OSHA PEL - not established for any component in this formulation. The polyisobutylene, DOA or DOS, and process oil components of this material are not expected to present any significant health effects.

Carcinogenicity

Components not listed as carcinogens by the International Agency for Research on Cancer, National Toxicology Program or Occupational Safety and Health Administration.

Effects of Exposure

Skins and Eyes: Can cause allergic skin reaction. Can cause eye irritation. Avoid prolonged contact with skin. Avoid contact with eyes.

Inhalation and Ingestion: Chronic exposure to RDX dust has been reported to cause convulsions or unconsciousness. Chronic local and systemic effects are not fully known. Inhalation and ingestion can result in systemic poisoning, usually affecting the bone marrow (blood cell producing system) and the liver. Avoid inhalation and ingestion of dust.

Emergency First Aid Procedures

Eyes: in case of contact, flush thoroughly with large amounts of low pressure water for at least 15 minutes. Remove contact lenses. Get medical attention.

Skin: Wash with soap and warm running water. Clean clothing thoroughly and dispose of shoes contaminated with explosives in accordance with explosives disposal procedures. Get medical attention for rash or irritation.

Inhalation: Remove to fresh air. Treat any irritation symptomatically. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: If conscious, induce vomiting immediately by giving 1 or 2 glasses of water and touching back of throat with finger or blunt object, or by giving syrup of ipecac. Never give anything by mouth to an unconscious person. Get medical attention.

Section VII. Special Protection Information.

Respiratory Protection

NA

Ventilation

NA

Protective Gloves

If prolonged or repeated skin contact may occur, impervious gloves are recommended.

Eye Protection

Industrial safety glasses are recommended for any type of industrial chemical handling

Other Protective Equipment

For explosive-handling workers, caps and coveralls for full body protection are recommended. Cotton underwear, socks, and conductive shoes are recommended to avoid human static discharge. A safety shower, an eye bath, and washing facilities should be available. As a precaution, handle only in well ventilated areas, change clothing daily, bathe at the end of the work period, and wash hands thoroughly after handling.

Section VIII. Spill or Leak Procedures.

Steps to be Taken if Material is Released or Spilled:

Clean up spills immediately using a soft bristle brush and a conductive rubber pan or rubber shovel. Use conductive containers and ground all containers before transferring explosives between containers. Treat like a flammable solvent with regard to electrostatic discharge. Avoid pinching material, metal to metal contact, impact with sharp objects, friction or other situations which may initiate the explosive. Avoid sand, glass, grit, and metal fragments which may sensitize the material to impact and/or friction. Wet with water to desensitize.

Waste Disposal Method

Explosives should be destroyed by open burning, by burning in an approved incinerator, or by chemical treatment with caustics. The disposal site should be located to provide adequate quantity-distance protection for adjacent facilities and personnel. Explosives should not be burned in containers. The explosive should be ignited remotely. Personnel should wear flame resistant clothing. The disposal of explosives should comply with all applicable federal, state and local regulations

Refer to Section IV for precautions when burning. Store and handle waste explosives as Class A explosives. Transport in accordance with DOT regulations for Class A explosives. Obtain approval from the appropriate Safety Agency before disposal.

Section IX. Special Precautions.

Precautions to be Taken in Storage and Handling.

High explosives should be stored in approved explosives magazines in accordance with AMCR 385-100. Storage and handling must be carried out in accordance with appropriate Safety Agency regulations concerning quantity-distance, barricading, personnel exposure and material handling equipment. Recycle or dispose of used containers in accordance with appropriate Safety Agency regulations. In buildings and locations where explosives with spark energies for initiation not greater than 0.02 joules are handled, the relative humidity should be 50% or greater. Dust generated by handling must be cleaned up on a continuing basis.

Other Precautions

CAUTION: Explosives must be tested for compatibility with any materials which they contact. Materials include other explosives, solvents, adhesives, metals, plastics, paints, cleaning compound, floor and table coverings, packing materials, and other similar materials and equipment. Keep container closed. Wash thoroughly after handling. Wash contaminated

clothing before reuse. Extreme care should be exercised during maintenance of explosives contaminated equipment. Decontamination procedures include washing/steaming, chemical decontamination, and thermal decontamination. Decontamination should be performed prior to welding, cutting or grinding metal parts. Penetrating oil should be used liberally on nuts, bolts, and all threaded connections to aid in desensitizing hidden explosives prior to disassembly. Refer to AMCR 385-100, paragraph 16-18.

BR-2/3A LITHIUM EFS BATTERY

The BR-2/3A lithium battery is used to power electronic function select circuitry on certain sonobuoys. Such sonobuoys have two BR-2/3A batteries mounted on a circuit board in the upper electronics package. The BR-2/3A battery is about the size of a standard 'AA' cell. The BR-2/3A battery is considered 'NON-REGULATED' by the Department of Transportation. The following excerpt is from a letter issued by Panasonic Industrial Company, the manufacturer of the BR-2/3A battery. The letter is on file and a copy can be obtained through the Sonobuoy Hotline.

"Material Safety Data Sheets (MSDS) are a subrequirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an 'Article.' OSHA has defined 'article' as a manufactured item: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which does not release, or otherwise result in exposure to, a hazardous chemical, under normal conditions of use. OSHA the goes on to define 'hazardous chemical' and 'exposure.'

Because all of our batteries are defined as 'articles', they are exempt from the requirements of the Hazard Communication Standard 29 CFR 1910.1200, hence a MSDS is not required.

The following components are found in a Panasonic poly-carbonmonofluride (BR) lithium ($LiCF_x$) battery:

Cathode	Poly-carbonmonofluride $(CF)_n$
Anode	Lithium (Li)
Electrolyte	Tetrafloroborate ($LiBF_4$)
	y-butyrolactone (y-BL)
	Tetrahydrofuran (THF)

If one of our batteries should leak electrolyte, wash the area with copious amounts of water…."

CR-3032 LITHIUM EFS BATTERY

The Panasonic CR-3032 lithium battery is used to power electronic function select circuitry on certain sonobuoys. Such sonobuoys have two CR-3032 batteries mounted on a circuit board in the upper electronics package. The CR-3032 battery is a 'wafer' style battery about the size of a half dollar. The CR-3032 battery is considered 'NON-REGULATED' by the Department of Transportation. The following excerpt is from a letter issued by Panasonic Industrial Company, the manufacturer of the CR-3032 battery. The letter is on file and a copy can be obtained through the Sonobuoy Hotline.

"Material Safety Data Sheets (MSDS) are a subrequirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an 'Article.' OSHA has defined 'article' as a manufactured item: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which does not release, or otherwise result in exposure to, a hazardous chemical, under normal conditions of use. OSHA the goes on to define 'hazardous chemical' and 'exposure.'

Because all of our batteries are defined as 'articles', they are exempt from the requirements of the Hazard Communication Standard 29 CFR 1910.1200, hence a MSDS is not required.

The following components are found in a Panasonic nickel-cadmium battery:

Nickel Hydroxide	0-10%	Positive Electrode
Oxy Nickel Hydroxide	1-12%	Positive Electrode
Cadmium	1-15%	Negative Electrode
Cadmium Hydroxide	3-16%	Negative Electrode
Potassium Hydroxide	2-4%	Electrolyte (Regular)
Sodium Hydroxide	2-4%	Electrolyte (High Temp)
Lithium Hydroxide	2-9%	Electrolyte (Both)

Concentrations of components in nickel-cadmium batteries depend on the state of charge or discharge. The hazardous waste code for nickel-cadmium batteries is D006.

If one of the batteries should leak electrolyte, wash the area with copious amounts of water."

Silver Chloride Saltwater Activated Battery MSDS

IDENTITY
Silver Chloride Magnesium Battery

Manufacturer:	Magnavolt, Inc. 5335 US Business 70 Clayton, NC 25720	Emergency: 919-790-9686 Information: 919-790-9686

Date Prepared: 04/15-96

==========

SECTION II - Hazardous Ingredients / Identity Information

Hazardous Components	CAS #	OSHA PEL	ACGIH TLV
Silver Chloride	7783-90-6	10 ug/m3	10 ug/m3
Magnesium	1309-48-4	15 mgs/m3	10 mgs/m3

(Under normal conditions of use or service this battery dose not expose user to toxic fumes)

This product contains the following EPCRA Section 313 chemicals: Silver and its compounds.

==========

SECTION III - Physical / Chemical Characteristics

Boiling Point NA	Specific Gravity (H2O=1) NA
Vapor Pressure (mm hg) NA	Melting Point 851 to 1220 F
Vapor Density (Air=1) NA	Evaporation Rate (Butyl Acetate=1) NA
Solubility in Water NA	Appearance and Odor No Odor

==========

SECTION IV - Fire and Explosion Hazard Data

Flash Point	Flammable Limits	
NA	LEL - NA	UEL - NA

Extinguishing Media
Dry Chemical Extinguisher

Special Fire Fighting Procedures
Avoid breathing fumes, wear self-contained breathing apparatus.

Unusual Fire and Explosion Hazards
Intense heat and smoke from burning metal, plastic, and rubber components. When heated to a temperature near Magnesium's melting point, magnesium alloys ignite and burn with a white flame. Use of water on molten magnesium will produce hydrogen gas and may cause an explosion.

==========

SECTION V - Reactivity Data

Stability	Unstable	Conditions to Avoid
Normal	NA	NA

Incompatibility (Material to Avoid)
NA

Hazardous Decomposition Byproducts
NA

==========

SECTION VI - Health Hazard Data

Route of Entry	Inhalation?	Skin?	Ingestion?
	X	X	X

Health Hazards (Acute and Chronic)
Silver bio-accumulates in human tissue.

Carcinogenicity	NTP?	IARC?	OSHA?
	No	No	No

Signs and Symptoms of Exposure to Silver: Argyria

Medical Conditions commonly aggravated by exposure: NA

Emergency and first aid procedures:
Remove injured personnel from area immediately.

==========

SECTION VII - Precautions for Safe Handling and Use

Steps to be Taken if Material Released or Spilled: NA

Waste Disposal Method:
Batteries contain silver and should be recycled in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Avoid exposure to intense heat or fire.

==========

Lead Chloride Saltwater Activated Battery MSDS

IDENTITY
Lead (II) Chloride -11516-

Manufacturer: American Hoechst Corp.
Route 202-206 North
Somerville, NJ 08878

Emergency: 201-231-2244
Information: 201-231-2244

Date Prepared: 12/03/85

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SECTION II - Hazardous Ingredients / Identity Information

Hazardous Components	CAS #
Lead Chloride	07758-95-4 Inhalation, ingestion, TLV TWA: 0.15 mg/m3 (as PB)

==========

SECTION III - Physical / Chemical Characteristics

Boiling Point 950 C	Specific Gravity (H2O=1) N.M.
Vapor Pressure (mm hg) NA	Melting Point 501 C
Density 5.85	Evaporation Rate D.N.A.
Solubility in Water 9.9 G/L 20 C	Appearance and Odor Solid, colorless, odorless
Decomposition Temp. N.M.	Acid Number D.N.A.
% Volatile D.N.A.	Vapor Density 1 mm/HG 547 C

Viscosity	Drop Point
D.N.A.	D.N.A.
Ignition Temp	Refractive Index
N.M.	D.N.A.
Freezing Point	D.N.A.= Does Not Apply
D.N.A.	N.M. = Not Measured

==========

SECTION IV - Fire and Explosion Hazard Data

Flash Point
D.N.A.

Explosive Limits
LEL - D.N.A. UEL - D.N.A.

Extinguishing Media
Carbon Dioxide, Water Spray or Dry Chemical Extinguisher

Special Fire Fighting Procedures
Wear self-contained breathing apparatus and full protective clothing.

Unusual Fire and Explosion Hazards
Emits highly toxic fumes under fire conditions.

==========

SECTION V - Health Information

Effects of Overexposure:
Symptoms are pallor skin, lassitude, fatigue, skin pigmentation, weight loss, dermatitis, keratosis, metallic taste, salivation, abdominal cramps, anorexia, phlebitis, constipation, diarrhea, nausea, vomiting, numbness, ataxia, tremors, cachexia, paralysis, hypertension, nocturia, uremia, headache, irritability, kidney and liver damage.

TOXICITY:	TEST	DOSE	UL	U/M	DURATION
	ORL-GPG	LDLO	1500	MG/KG	
	ORL-RAT	TDLO	570	MG/KG	(1)
	ORL-RAT	TDLO	201	MG/KG	(1)
	IVN-MUS	TDLO	40	MG/KG	(2)

The product is reported to cause reproductive effects in rats and mice (1,2).

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SECTION VI - Occupational Exposure Limits

THRESHOLD LIMIT- PPM- mg/cm3-
See Section II

==========

SECTION VII - Emergency First Aid Procedures

Inhalation: Remove victim to fresh air. Get immediate medical help.

Eye Contact: Flush thoroughly with water for 15 minutes. Get immediate medical help.

Skin Contact: Immediately remove contaminated clothing and wash affected area thoroughly with soap and water. Get immediate medical help.

Ingestion: Get immediate medical help.

Additional Measures: None found.

==========

SECTION VIII - Reactivity Data

Chemical Stability:
Stable

Hazardous Polymerization:
Will not occur.

Conditions to Avoid: Avoid contact with oxidizing agents. Avoid contact with peroxide, active metals, sodium and potassium.

Hazardous Decomposition Products: Thermal decomposition may generate lead or lead chloride vapors.

==========

SECTION IX - Spill or Leak Procedures

Spill or Leak Procedures:
Collect into suitable container.

Waste Disposal:
Listed as a hazardous substance, as defined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

==========

SECTION X - Employees Protection

Respiratory Protection: See Section II

Protective Clothing: Clothing suitable to avoid skin contact. Safety goggles. Rubber gloves.

Additional Measures: Use local exhaust venting.

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SECTION XI - Special Precautions

Store in original container. Keep tightly sealed.

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SECTION XII - Transportation and Other Regulatory Requirements

DOT Proper Shipping Name:	Lead Chloride (RQ-5000/2270)
DOT Classification:	ORM-B
UN/NA:	NA 2291
Packaging:	49 CFR 173.505, 173.800
Passenger Acft:	25 lbs MAX
Cargo Acft:	100 lbs MAX

Other Regulatory Controls: See state right to know laws.

==========

Thermal Battery MSDS

IDENTITY
Thermal Battery

Manufacturer: Westinghouse Electric Corp.
18901 Euclid Ave
Cleveland, OH 44117

Emergency: 216-692-5032
Information: 216-692-5032

Date Prepared:

==========

SECTION II - Hazardous Ingredients

Paints, Preservatives & Solvents
NA

Alloys and Metallic Coatings
Base Metal - 304 Stainless Steel

Hazardous Mixtures of Other Liquids, Solids or Gases
NA

==========

SECTION III - Physical Data

Boiling Point
NA

Specific Gravity (H2O=1)
1.56 gr/cc

Vapor Pressure (mm hg)
NA

Percent Volatile by Volume
NA

Vapor Density (Air=1)
NA

Evaporation Rate
NA

Solubility in Water
NA

Appearance and Odor
S. S. Container

==========

SECTION IV - Fire and Explosion Hazard Data

Flash Point	Flammable Limits	
NA	LEL - NA	UEL - NA

Extinguishing Media
Let the battery cool down. Let battery cool in air or quench in water if no evidence of seal leakage.

Special Fire Fighting Procedures
Smother with Lithium Chloride Salts or Lith-X powder.

Unusual Fire and Explosion Hazards
Do not expose ruptured battery to water.

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SECTION V - Health Hazard Data

Threshold Limit Value: NA
Effects of Overexposure: NA
Emergency and First Aid Procedures: NA

==========

SECTION VI - Reactivity Data

Stability: NA
Incompatibility: NA
Hazardous Decomposition Products: NA
Hazardous Polymerization: NA
Conditions to Avoid: NA

==========

SECTION VII - Spill or Leak Procedures

Steps to be Taken if Material Released or Spilled:
Keep battery contents away from water and place in a sealed metal container.

Waste Disposal Method:
1. Detoxification
2. Hazardous landfill
3. Dump in ocean > 50 mile limit at > 600 fathoms

==========

SECTION VIII - Special Protection Information

Respiratory Protection: NA

Ventilation: NA
Local Exhaust: NA
Mechanical: NA
Special: NA
Other: NA

Protective Gloves:
High temperature gloves if needed to handle hot battery.

Eye Protection:
Safety Glasses.

Other Protective Equipment:
Do not handle hot thermal battery.

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SECTION IX - Special Precautions

Precautions to be Taken in Handling and Storage:
Handling/Storage Temperature range -20˚ C to + 55˚ C

Other Precautions:
Store in unit packaging containers until ready to use.

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HAZARD COMMUNICATION GUIDE - Thermal Battery

I. GENERAL INFORMATION

Chemical Name & Synonyms: NA
Trade Name & Synonyms: Lithium/Cobalt Disulfide Battery
Chemical Family: NA
Formula: NA
Proper DOT Shipping Name: Lithium Battery Solid Cathode, UN 3090
DOT Hazard Classification: Class 9, PG II
Manufacturer: Westinghouse Electric Corp., Naval Systems Division
Manufacturer's Address: 18901 Euclid Ave., Cleveland, OH 44117
Manufacturer's Phone: 216-486-8300

==========

II. INGREDIENTS

Principal Hazardous Components	Percent	Threshold Limit Value (Units)
Lithium-Silicon Alloy	5.44	0
Cobalt Disulfide	5.36	0
Iron - $KClO_4$ Heat Pellets	19.0	0

==========

III. PHYSICAL DATA

Boiling Point: NA
Vapor Pressure: NA
Vapor Density: NA
Solubility in Water: NA
Appearance and Odor: NA

Specific Gravity: NA
Percent Volatile by Volume: NA
Evaporation Rate: NA
pH: NA

==========

IV. FIRE & EXPLOSION HAZARD DATA

Flash Point: NA

Auto Ignition Temp: NA

Flammable Limits:	LEL	UEL
	270˚ F	330˚ F

Extinguishing Media:
Let the battery cool in air or quench in water if no evidence of seal leakage.

Special Fire Fighting Procedures:
Smother with Lithium Chloride Salt or Lith-X powder.

Unusual Fire & Explosion Hazards:
None

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V. HEALTH HAZARD DATA

Threshold Limit Data: NA
Carcinogen NTP Program: NA
Carcinogen ARC Program: NA
Symptoms of Exposure: NA
Medical Conditions Aggravated by Exposure:
Inhalation of CoS_2 powder only if Case is Ruptured.
Primary Route of Entry: NA

Emergency First Aid: NA

==========

VI. REACTIVITY DATA

Stability: NA

Conditions to Avoid:
Rupture Case in Presence of Water.

Hazardous polymerization: NA

Condition to Avoid:
Anything that could rupture the battery case.

Hazardous Decomposition Products: NA

==========

VII. ENVIRONMENTAL PROTECTION PROCEDURES

Spill Response:
Place contents into a sealed metal container.

Waste Disposal Procedures:
Detoxification
Hazardous Landfill
At Sea-dump > 50 miles out and > 600 fathoms

==========

VIII. SPECIAL PROTECTION INFORMATION

Eye Protection: None
Skin Protection: None
Respiratory Protection: None
Ventilation Recommended: None
Other Protection: None

==========

IX. SPECIAL PRECAUTIONS

Hygienic Practices in Storage & Handling: None
Precautions for Repair & Maintenance of Contaminated Equipment: None
Other Precautions: None

==========

Carbon Dioxide Gas Cylinder MSDS

IDENTITY
Carbon Dioxide (CO_2) Gas Cylinder

Manufacturer: Nippon Transan Gas Co
32-26 3 Chome Aoi Adachi
Tokyo, Japan

Emergency: Tokyo 03-849-1571
Information: Tokyo 03-849-1571

Nittan, Inc (USA) 619-272-6113

==========

SECTION II - Hazardous Ingredients / Identity Information

Hazardous Components	CAS #	OSHA PEL	ACGIH TLV
Does Not Apply			

==========

SECTION III - Physical / Chemical Characteristics

Boiling Point
-78.48 (at latm ˚C)

Specific Gravity (H2O=1)
1.977 (at 0 ˚C latm kg/m^3)

Vapor Pressure (mm hg)
35.54 (at 0 ˚C kgf/cm^3 abs)

Melting Point
N/A

Vapor Density (Air=1)
1.52

Evaporation Rate (Butyl Acetate=1)
NA

Solubility in Water
1.713 (at 0 ˚C latm m^3/water m^3)

Appearance and Odor
Colorless gas, None

==========

SECTION IV - Fire and Explosion Hazard Data

Flash Point
Nonflammable gas

Flammable Limits
LEL - NA UEL - NA

Extinguishing Media
N/A

Special Fire Fighting Procedures
N/A

Unusual Fire and Explosion Hazards
N/A

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SECTION V - Reactivity Data

Stability	Unstable	Conditions to Avoid
Stable at normal temperature	N/A	Keep out of heat

Incompatibility (Material to Avoid)
N/A

Hazardous Decomposition Byproducts
N/A

==========

SECTION VI - Health Hazard Data

Route of Entry	Inhalation?	Skin?	Ingestion?
	X	X	X

Health Hazards (Acute and Chronic)
N/A

Carcinogenicity	NTP?	IARC?	OSHA?
	No	No	No

Signs and Symptoms of Exposure to Silver: Argyria

Medical Conditions commonly aggravated by exposure: N/A

Emergency and first aid procedures:
Breath oxygen and air to ventilate lungs.

==========

SECTION VII - Precautions for Safe Handling and Use

Steps to be Taken if Material Released or Spilled: Keep room well ventilated

Waste Disposal Method:
Keep room well ventilated

Precautions to be taken in handling and storage:
Keep out of heat; keep out of fire

==========

Typical Electric Squib MSDS

IDENTITY
Cartridge, P/N 073022/005

Manufacturer:	Cartridge Actuated Devices, INC. 123 Clinton Rd. Fairfield, NJ 07004	Emergency: 800-424-9300 Information: 201-575-1312

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SECTION II - Hazardous Ingredients / Exposure Limits

Hazardous Components	CAS #	OSHA PEL	ACGIH TLV
Potassium Perchlorate	7778-74-7		
Lead Thiocynate	592-87-0		
Aluminum-atomized powder			

==========

SECTION III - Physical / Chemical Characteristics

Boiling Point NA	Specific Gravity NA
Vapor Pressure (mm hg) Negligible	pH NA
% Volatile Negligible	Evaporation Rate NA
Solubility in Water NA	

==========

SECTION IV - Fire, Explosion, and Reactivity Hazard Data

Flash Point NA	Flammable Limits LEL - NA	UEL - NA

Extinguishing Media
Water, CO2

Special Fire Fighting Procedures
Do not use halogen extinguisher

Grounding Procedures
Keep shunted when handling

Incompatibility
None

Hazardous Decomposition Byproducts/Hazardous products of combustion
Sulfur dioxide, traces of lead, hydrochloric acid, flame and blast effect

==========

SECTION V - Health Hazard Data

Route of Entry NA

Reported effects on humans
None if cartridge remains intact: Lead in out gases when fired; Cramping in lower abdomen

Carcinogenicity None

Emergency and first aid procedures:
Treat burns and any laceration by cleaning and applying sterile bandages. Transport individual for further medical treatment.

==========

SECTION VI - Spill and Leak Procedures

Steps to be Taken if Material Released or Spilled:
Clean spill after liberally wetting down area with solvent (acetone, Butyl Acetate or alcohol) by wiping meterial up with paper towels or cotton rag. Keep a fire extinguisher present. (Non-halogen)

Waste Disposal Method:
Burn in the open in an isolated location. Remotely ignite with slow burning train or electrically initiated squib. Disposal must be in accordance with local, state and federal regulations.

Call Cartridge Actuated Devices for assistance if needed.

==========

Part VII. Applicable Control Measures.

Appropriate Hygienic Practices
NA

Personal protection equipment
Safety glasses, grounding devices (ground straps and/or conductive footwear.)

Work practices
Avoid high temperatures. Keep the cartridge shunted and wear protective equipment

Handling & Storage precautions
Recommended storage 70°F, keep shunted

Engineering controls
Keep shunted until installed

Protective measures during repair and maintenance
Eliminate static discharge sources. Avoid flame or high heat. Shield device when working on or ground the cartridge.

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